

## REMARKS

### Section 103 Claim Rejections

The Examiner finally rejected Claims 1-9, 11-13, 15-19 and 21-25 under §103 over U.S. Patent No. 6,590,133 to Stanforth et al. in combination with U.S. Patent No. 5,931,773 to Pisani et al or in combination with Ruby et al., *Advances in evaluating the oral bioavailability of inorganics in soil for use in human health risk assessment*, Envtl. Sci. & Tech. 33(21):3697-3705 (1999). Commenting on Applicants' prior response, the Examiner asserted that while Stanforth teaches using ferrous iron additives, Stanforth also teaches using a ferric iron additive to reduce iron bioavailability. All newly presented amendments are intended to place the claims into condition for allowance. In view of the amendments above and the arguments below, Applicants respectfully request reconsideration of the merits of this patent application.

While acknowledging that Stanforth included ferric iron in some trials, including a trial with phosphate and chloride, Applicants respectfully disagree with the Examiner's conclusion that Stanforth motivates the skilled person in any way to include ferric iron in a treatment process. In fact, the opposite is true – Stanforth suggests no role for ferric iron in a method for reducing PBET solubility of lead. Applicants point out that each claims must be examined as a whole and not as a mere series of steps, and respectfully suggest that it is improper to consider only the chemical treatment without also considering the incubation and the problem addressed by the claimed method when evaluating obviousness.

The Examiner correctly points out that in Stanforth a combination of phosphate, chloride and ferric iron yielded a PBET lead concentrations of 6.2 and 2.7 mg/L under acid and neutral conditions, respectively. However, the Examiner is incorrect in stating on pages 3 and 5 that “[i]n order to enhance the P/Cl treatment, the introduction of an iron ion into the soil will further reduce the availability of lead”, and on pages 4 and 5/6 that “Stanforth uses a ferric iron additive and achieves reduction in the level of iron [sic, lead] bioavailability”. In particular, the Examiner overlooked the fact that the values achieved with ferric iron (6.2 and 2.7 mg/L) are not significantly different from the values achieved with an iron-free, phosphate plus chloride treatment (4.7 and 3.6 mg/L, respectively). Indeed, these values suggest that under acidic conditions, where lead is more soluble, one would be better off omitting ferric iron from the treatment. Thus, as far as it relates to treatment with phosphate and chloride and iron, Stanforth teaches away from using ferric iron since under Stanforth's conditions, ferric iron did not meaningfully affect the treatment outcome. In such treatments,

only ferrous iron with oxidation contributed a meaningful enhancement beyond an iron-free treatment with phosphate and chloride treatment (see Table 4, third section, final row). Because one would not be motivated to include steps and agents that merely increase time and cost without improving results, one seeking to achieve the immobilization levels shown in the third section of Table 4 would have either omitted ferric iron from Stanforth's method, or used ferrous iron had further immobilization been desired.

For the reasons noted above, Stanforth does not bring the art as close to the present invention as the Examiner suggests, teaching as it does that ferric ions do not reduce lead solubility to a level that yields an acceptable product. Instead, Stanforth points the skilled person in a different direction, namely use of ferrous ions with oxidation. Upon considering Stanforth, the art would still need some motivation to employ ferric iron in a treatment reaction in the first instance, with or without the Applicants' incubation step, which is itself acknowledged by the Examiner to be absent from Stanforth. Moreover, Stanforth never even hints that an incubation step might be desirable in an alternative method that employs otherwise unsuitable ferric ions.

In contrast, Applicants take a different approach, coupling a chemical treatment regimen explicitly rejected by Stanforth with an incubation step not contemplated by, and perhaps not necessary in, Stanforth. While the resultant PBET data may be similar between the methods, the methods and the products are distinct, and the Applicants' product is acceptable where Stanforth's was not. In fact, Applicants' incubation step yields advantageous structural differences in the products over those produced by combining Stanforth with Pisani or Ruby. Even assuming some motivation to combine the cited documents (and Applicants have significant doubts that Stanforth would have pursued a method using ferric ions at all), the claimed invention is further distinguished in that the resulting product has attributes that would not be observed.

To draw the secondary references closer to Stanforth, the Examiner asserts an expectation that a process that lowers lead permeability and leachability also lowers lead bioavailability. Applicants respectfully disagree with this expectation and with the Examiner's equation of incubation for a time and at a temperature, as claimed, with the curing (Pisani) or incubation (Ruby) of the secondary documents.

Pisani is said to disclose treatment of solid waste for reducing permeability and thus reducing the leachability and mobility of metal, producing a material that exhibits maximum compaction characteristics (see col. 3, l. 39-43). The Pisani method forms a cementitious matrix for increased unconfined compressive strength and decreased permeability, in effect

trapping the contaminated waste in the matrix to reduce permeability, mobility, etc. However, reduced permeability is not essential to reduced leachability, mobility or metal bioavailability, and can often be undesirable. For example, when lead contamination is shallow but widespread, as in the case of near, e.g., lead smelters, firing ranges, and the like, a cementitious mass would have poor drainage properties, would not support growth of vegetation, and would be unsightly. As Applicants further noted at paragraph 0014 of the Specification, then-existing methods for reducing permeability of particulate matter or for reducing heavy metal leaching had not achieved the reduced bioavailability of the present invention.

In contrast to prior permeability-reducing methods, such as that of Pisani, the present invention yields a material having a high permeability coefficient (and low specific filtration resistance or SFR). In general, filtration involves the flow of fluid through a compressible bed of solids. SFR is a measure of the filterability of solid from a fluid slurry. The lower the SFR of the slurry, the higher its filterability.<sup>1</sup> Whereas the Pisani material is designed to have a high SFR, the product that results from the claimed method with incubation has a low SFR. Products of the claimed methods are more permeable than those produced by Pisani's chemical curing, and may be left in place or may be beneficially reused, and support superior dewatering of the solid matrix than the low-permeability material of Pisani. Applicants here amend claims 12 and 15 to reflect this difference further point out this distinction, removing references to cement from the claims.

Applicants appreciate the Examiner's acknowledgment that Ruby is concerned only with incubation of a phosphate-treated material. Ruby is silent as to the utility, desirability or effect of an incubation treatment on the treatment materials recited in the claims. For this reason, the skilled artisan provides no motivation to combine Ruby with Stanforth, especially absent any indication in Ruby or Stanforth of the suitability of phosphate in combination with chloride and ferric iron in the method. At best, Ruby might make it obvious for a skilled person to try an incubation step after Stanforth's different (and discounted) chemical treatment because of some prior experience with phosphate, but "obvious to try" is not the standard for determining obviousness.

---

<sup>1</sup> Like filtration, permeability involves flow of a fluid through a solid, expressed by a coefficient of permeability (COP). As the COP of a fluid increases so does its ability to flow through a solid. SFR is inversely proportional to COP -- a solid having a lower SFR would allow fluid to flow faster through the solid than a solid having a higher SFR. In other words, a solid having a lower SFR would exhibit higher permeability than a solid having a higher SFR.

Applicants respectfully request reconsideration and withdrawal of the rejections of Claims 1-9, 11-13, 15-19 and 21-25.

A petition for a two-month extension of time accompanies this response so the response will be deemed to have been timely filed. Please charge the appropriate petition fee to Deposit Account No. 17-0055. Should any other extension of time be due in this or any subsequent response, please consider this to be a request for the appropriate extension of time and a request to charge the fee due to the same Deposit Account.

No other fee is believed due in connection with this submission. However, should any other fee be due in this or any subsequent response please charge the fee to Deposit Account No. 17-0055.

Respectfully submitted,



Bennett J. Benson  
Reg. No. 37,094  
Attorney for Applicants  
QUARLES & BRADY LLP  
P.O. Box 2113  
Madison, WI 53701-2113

TEL (608) 251-5000  
FAX (608) 251-9166